



AUTOMATING E-GOVERNMENT SERVICES WITH ARTIFICIAL INTELLIGENCE

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Abstract:

Artificial Intelligence (AI) has recently advanced the state-of-art results in an ever-growing number of domains. However, it still faces several challenges that hinder its deployment in the e-government applications both for improving the e-government systems and the e-government-citizens interactions. In this paper, we address the challenges of e-government systems and propose a framework that utilizes AI technologies to automate and facilitate e-government services. Specifically, we first outline a framework for the management of e-government information resources. Second, we develop a set of deep learning models that aim to automate several e-government services. Third, we propose a smart e-government platform architecture that supports the development and implementation of AI applications of e-government. Our overarching goal is to utilize trustworthy AI techniques in advancing the current state of e-government services in order to minimize processing times, reduce costs, and improve citizens' satisfaction.

Keywords: *Artificial intelligence, deep learning, E-government, web services.*

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I. INTRODUCTION

Artificial Intelligence (AI) has been around for some decades in several theoretical forms and complicated systems; however, only recent advances in computational powers and big data have enabled AI to achieve outstanding results in an ever-growing number of domains. For example, AI have tremendously advanced the areas of computer vision [1], medical applications [2], natural language processing [3], reinforcement learning [4], and several other domains. AI can be defined as the ability of a computer to imitate the intelligence of human behaviour while improving its own performance. AI is not only robotics, rather an intelligent behaviour of an autonomous machine that describes the brain of the machine and not its body; it can drive a car, play a game, and perform diverse sophisticated jobs. AI is a field that falls at the intersections of several other domains, including Machine Learning [5], Deep Learning [6], Natural Languages Processing [3], Context

Awareness [7], and Data Security and Privacy [8]. Figure 1 illustrates the intersections and relationship of the AI field with related fields. Machine Learning (ML) is the ability of an algorithm to learn from prior data in order to produce a smart behaviour and make correct decisions in various situations that it has never faced before. ML algorithms are enabled by training a computational model, which is the process of exposing an algorithm to a large dataset (e.g., citizens' demographics) in order to predict future behaviours (e.g., employment rates). The process of learning from prior datasets is known as a supervised learning.

Unlike traditional ML algorithms, Deep Learning, a subfield of ML, has emerged to overcome the limitations of prior ML algorithms. Deep learning can be defined as a mapping function that maps raw input data (e.g., a medical image) to the desired output (e.g., diagnosis) by minimizing a loss function using some optimization approach, such as stochastic gradient descent (SGD) [9]. Deep

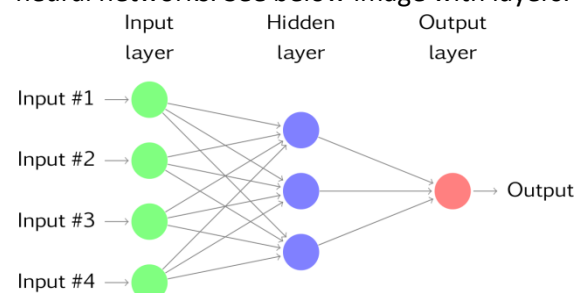


learning algorithms, inspired by the neural networks in the human brain, are built with a large number of hierarchical artificial neural networks that map the raw input data (inserted at the input layer) to the desired output (produced at the output layer) through a large number of layers (known as hidden layers), and thus the name deep learning. The hidden layers are responsible for the actual mapping process, which is a series of simple but nonlinear mathematical operations (i.e., a dot product followed by a nonlinear process). The main advantage of deep learning is that it does not require feature engineering.

Despite the fact that deep learning has improved the state-of-art results in several domains, it is still evident that e-government applications face several challenges regarding adapting deep learning [10]. First, given the recent and rapid advances in the deep learning domain, it is becoming more difficult to find experts of this technology who are capable of developing efficient and reliable AI applications, especially in third world countries. Second, the development lifecycle of AI projects, especially deep learning, has introduced a new set of development challenges. In particular, traditional software development focuses on meeting a set of required functional and non-functional requirements; in contrast, deep learning development focuses on optimizing a specific metric based on a large set of parameters, which is done in a unsystematic search approach. Third, integrating AI and deep learning applications in e-government services requires strong policies and measures on data security and privacy. However, there are still challenges that hinder the creation of concrete standards for data security and privacy, including citizen-government trust, transparency, and other technical difficulties related to developing and implementing secure systems.

II. RELATED STUDY

To demonstrate how to build a convolutional neural network based image classifier, we shall build a 6 layer neural network that will identify and separate one image from other. This network that we shall build is a very small network that we can run on a CPU as well. Traditional neural networks that are very good at doing image classification have many more parameters and take a lot of time if trained on normal CPU. However, our objective is to show how to build a real-world convolutional neural network using TENSORFLOW. Neural Networks are essentially mathematical models to solve an optimization problem. They are made of neurons, the basic computation unit of neural networks. A neuron takes an input (say x), do some computation on it (say: multiply it with a variable w and adds another variable b) to produce a value (say; $z = wx + b$). This value is passed to a non-linear function called activation function (f) to produce the final output (activation) of a neuron. There are many kinds of activation functions. One of the popular activation function is Sigmoid. The neuron which uses sigmoid function as an activation function will be called sigmoid neuron. Depending on the activation functions, neurons are named and there are many kinds of them like RELU, TanH. If you stack neurons in a single line, it's called a layer; which is the next building block of neural networks. See below image with layers.



III. EXISTING SYSTEM



Recently, many countries have adopted e-government services in various departments and many autonomous applications. While there are several studies conducted for enhancing e-government services, only a few of them address utilizing recent advances in AI and deep learning in the automation of e-government services. Therefore, there is still an urgent need to utilize state-of-the-art AI techniques and algorithms to address e-government challenges and needs. In contrast, implementing e-government applications still faces several challenges, including the following:

Trust: trusting online services depends heavily on a couple of factors including, the citizens trust in the government itself, the quality of the online services, and the personal believes (e.g., there still a large number of citizens who prefer to handle paper applications rather than web services).

Lack of experts: implementing high-quality online services requires the establishment of the right team of experts that covers all involved practice areas from web development to security and privacy.

Inaccessibility: several third world countries still face significant issues on accessing the internet and its services.

Security: state-of-the-art security measures are required to secure e-government applications and the citizen's privacy.

IV. PROPOSED WORK

In this paper author describing concept to automate government services with Artificial Intelligence technology such as Deep Learning algorithm called Convolution Neural Networks (CNN). Government can introduce new schemes on internet and peoples can read news and notifications of such schemes and then peoples can write opinion about such schemes and these opinions can help government in taking better decisions. To

detect public opinions about schemes automatically we need to have software like human brains which can easily understand the opinion which peoples are writing is in favour of positive or negative. To build such automated opinion detection author is suggesting building CNN model which can work like human brains. This CNN model can be generated for any services and we can make it to work like automated decision making without any human interactions. To suggest this technique author already describing concept to implement multiple models in which one model can detect or recognize human hand written digits and second model can detect sentiment from text sentences which can be given by human about government schemes. In our extension model we added another model which can detect sentiment from person face image. Person face expressions can describe sentiments better than words or sentences. So our extension work can predict sentiments from person face images.

MODULES:

USER:

- 1) Generate Hand Written Digits Recognition Deep Learning Model: using this model we are building CNN based hand written model which take digit image as input and then predict the name of digit. CNN model can be generated by taking two types of images called train (train images contain all possible shapes of digits human can write in all possible ways) and test (Using test images train model will be tested whether its giving better prediction accuracy). Using all train images CNN will build the training model. While building model we will extract features from train images and then build a model. While testing also we will extract features from test image and then apply train model on that test image to classify it.



2) Generate Text & Image Based Sentiment Detection Deep Learning Model: using this module we will generate text and image based sentiment detection model. All possible positive and negative words will be used to generate text based sentiment model. All different types of facial expression images will be used to generate image based sentiment model. Whenever we input text or image then train model will be applied on that input to predict its sentiments.

3) Upload Test Image & Recognize Digit: By using this module we will upload text image and apply train model to recognize digit.

4) Write Your Opinion About Government Policies: using this module we will accept user's opinion and then save that opinion inside application to detect sentiment from opinion.

5) View Peoples Sentiments From Opinions: using this module user can see all users opinion and their sentiments detected through CNN model.

6) Upload Your Face Expression Photo About Government Policies: using this module user will upload his image with facial expression which indicates whether user is satisfy with this scheme or not.

Detect Sentiments From Face Expression Photo: using these module different users can see the facial expression image and detected sentiment which is uploaded by past users

WORKING METHODOLOGY:

This layer plays an important role in our proposed system. Its main goal is to provide and extend e-government automatic services and the core functionality for the above mentioned layers. The composition plan of this layer consists of four phases:

- Analysis: this phase stars from the abstract specification to a citizen request and

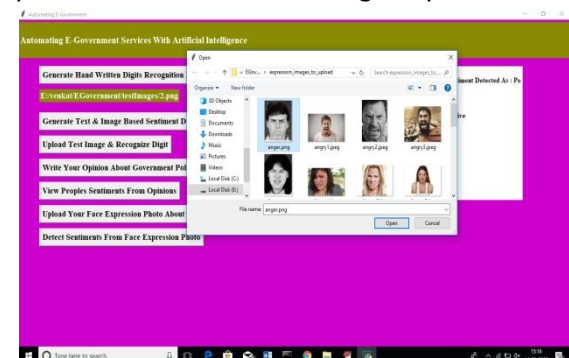
it aims to determine the required service in a meaningful way.

- Planning: where the discovery and configuration of the plan are created, and this process is done by the help of intelligent agents and AI techniques.

- Evaluation and optimization: which is responsible to find the best plan in terms of user specifications.

- Execution: since some problems of inconsistency may occur at run time, so reassessment and re-planning are necessary to ensure the proper execution of the services.

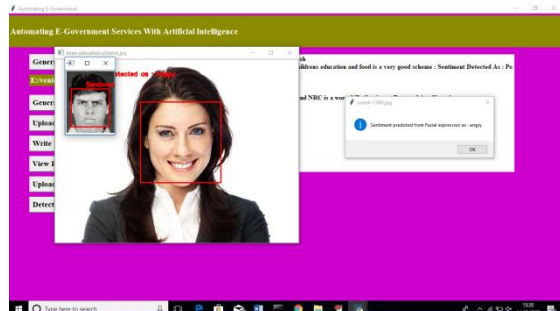
This will help to create open e-government that will produce a huge amount of organized data and information that help the public sector to play a vital role in supplement citizen services. In the recent years, governments have established different sets of frameworks and regulations that enabled open citizen services, new e-government markets, created smart products, and enhanced citizen-government transparency and trust. Different government agencies must provide detailed reports with keeping in mind the differences between central oversight and initiatives. Other agencies are appointed based on their governmental background, policies, and connection. Such agencies' leaders often do not serve long enough to witness the change since they tend to focus more on reforming policies rather than reforming the process.



In above screen I am uploading one anger face image and then application asks to write username and referring scheme name.



Similarly any number of users can upload their images. Now click on 'Detect Sentiments from Face Expression Photo' button to get all images and its detected sentiments



In above screen we can see all images with facial expression are identified with their sentiments. In dialog box also we can see sentiment result. Similarly you can enter any number of comments or facial images to detect their sentiments.

V. CONCLUSION

With the recent advances in AI and deep learning technologies, more government agencies are starting to use such technologies to improve their systems and services. However, a large set of challenges hinder the adoption of such technologies, including the lack of experts, computational resources, trust, and AI interpretability. In this paper, we introduced the definitions of artificial intelligence and e-government, briefly discussed the current state of e-government indices around the world, and then proposed our solutions to advance the current state of e-government, considering the Gulf Countries as a case study. We proposed a framework for management of government information resources that help manage the e-government lifecycle end-to-end. Then, we proposed a set of deep learning techniques that can help facilitate and automate several e-government services. After that, we proposed a smart platform for AI development and implementation in e-government. The overarching goal of this paper is to introduce new frameworks and platform to integrate recent advances in AI techniques in the e-government systems and

services to improve the overall trust, transparency, and efficiency of e-government.

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